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## The Actual Problem that Confronts the Irrigator.

Reprint of an address delivered by Mr. Don. H. Bark, at the Eighth Annual Convention of the Western Canada Irrigation Association, at Penticton, B.C., August, 1914.

Mr. Don H. BARK: Mr. Chairman, ladies and gentlemen,—  
The problems that confront the irrigators of the northwestern part of the United States are many in number and varied in nature, and as conditions here are more or less similar, there is no doubt but that the irrigators of the Canadian Provinces have or will encounter the same difficulties as their neighbours across the border. There are all kinds of irrigation projects in all of the various stages of development in the western part of the United States, and there is no doubt but that a detailed discussion of the methods that have been evolved for the solution of the many problems would be interesting and beneficial to the irrigators of Western Canada, but time will not permit. I have, therefore, decided to discuss the problems that have and now confront us under three main heads.

(1) The problem of learning how to properly prepare, plant, care for and irrigate a farm.

(2) The problem of securing finances with which to tide the irrigator over the lean period that almost invariably exists between the time the farm is first settled upon and the time it is producing profitable returns.

(3) The problem of marketing the crops that are ultimately produced at a profitable figure.

## PREPARATION AND CARE OF AN IRRIGATED FARM.

The first problem, that of knowing how to properly prepare a farm, and how to care for, and operate it after it is prepared, is thought by most new irrigators to be the sole and only problem that will confront them. The past experience, however, of thousands of our irrigators has proven that the problem is not yet half solved when the farm is all in crop.

Other serious problems are bound to confront them either singly or collectively.

## SELECTION OF A FARM.

Great care should be used at the outset in selecting an irrigated farm. Many types of soil and topography lend themselves quite readily to irrigation, but the best soil, however, and the one which works most easily, is a soil of a medium sandy loam nature of at least four feet in depth before a porous gravel, or an impervious stratum, is encountered. A medium sandy loam soil will absorb water readily, cultivate easily and will not dry out quickly after irrigation, while the heavy clay loam soils do not cultivate easily, and do not absorb water readily enough. The porous, gravelly soils on the other hand absorb water too easily, require irrigation oftener, and a larger amount per irrigation than the heavier soils, due to the losses of irrigation water which take place through deep percolation. The growing of green manure crops, or the application of barnyard manure to either the heavy soils on the one hand, or the coarse porous soils on the other hand, materially improve their mechanical condition so that they will not only produce larger crops, but they will produce them with less work and less water. The humus from the manure or from the crops that have been turned under render the porous soils more impervious, and the impervious soils more porous, thus better adapting them for irrigation farming.

The topography of an irrigation farm plays a most important part in the ultimate success of the operator. It is a common fault with many settlers from the eastern humid regions to pick out a farm that is too flat, having too small a slope to render irrigation easy. The other extreme of too great a slope is also

quite as serious, for the water requires more attention and more skillful handling on the steeper slopes in order to prevent erosion. It is believed that while slopes ranging from three or four feet per mile to as much as four or five hundred feet per mile can be irrigated, the ideal slope of an irrigated farm with medium soil lies between 20 and 50 feet. With this slope less levelling of the land is required and water can be supplied more rapidly and with less attention than with either the flatter or the steeper slopes.

The new farmer should also pay particular attention to the accessibility of water for his farm. Land within a reasonable distance of the source of supply should be selected, and not where long lines of flumes or heavy fills are necessary through which to convey water to it. The adequacy and constancy of the water supply should also be investigated. The amount found necessary will depend considerably upon the climate and the nature of the soil. For diversified crops on the average soils of Idaho, Colorado, Oregon and Washington, it has been found that at least two acre feet must be delivered within the four months irrigation season beginning May 1st. Cooler climates and higher altitudes will undoubtedly require less, while lower altitudes with longer seasons or more porous soils will undoubtedly require more.

Too much stress cannot be placed upon the benefits that are derived from careful preparation of the land for irrigation. It is safe to say that not over one acre out of every ten now irrigated in the United States is prepared for irrigation in the best possible manner. It will be admitted that this is a sweeping statement and one that will not be believed by all irrigators, but it is unquestionably true. Land should be so prepared, whatever irrigation system is used, that the irrigation water may be supplied evenly to its surface, for without even application there is either waste of water and time, or loss in crop production. In all of my experience I have never found an irrigator who admitted or complained of the fact that he had spent too much time or money in the preparation of his land for irrigation; the other extreme almost invariably obtains. Time does not permit a detailed discussion of the methods that should be recommended for the preparation of the land, but it is safe to say that there is but little land that lies so well but

that from ten to twenty-five dollars per acre could profitably be spent in fitting the surface for the proper application of irrigation water. More failures are due to improperly prepared land than to any other one thing, when it could so easily be done at the start by the farmer's own men and teams if too much were not attempted at the outset.

It is a common practice throughout the West for the new as well as the old irrigators to attempt to farm too much land. Forty acres well and intensively farmed is frequently more remunerative than a quarter section poorly farmed. This is well illustrated by the fact that the average production of irrigated alfalfa in Idaho as shown by the 1910 census was only 3.26 tons, while the yield of the first crop (there being three crops) at the Gooding Experiment Station during 1914 was 3½ tons of cured hay per acre, showing what care and intelligent application of water will do where the owner or operator is not farming more land than he can carefully care for. The irrigation farmers of Idaho and of the west in general are almost invariably endeavouring to operate too much land.

The farm ditches should be well and carefully made. Under the present practice in the Northwest they are almost universally too small to convey an adequate irrigation head with safety. Careful attention to this matter will frequently greatly increase the net profits that are derived from the farm.

Outside of the sugar beet growing districts, or the citrus belt of California, there is usually too little attention given to the preparation of the seed bed. All crops will normally respond better if planted in a carefully prepared seed bed, and if possible there should be sufficient moisture in the soil at the time of planting to bring the crop up. Outside of alfalfa, the clovers, and other natural grasses it rarely if ever pays to irrigate the crop up. It is better practice with the grains and potatoes to irrigate the soil first and plant the crops afterwards if there is insufficient moisture to bring them up.

#### CROP ROTATION.

In most arid regions where irrigation is necessary the soils, though containing a sufficient amount of mineral plant food to last for years, are deficient in nitrogen and in humus. Rotation

of crops such as will supply nitrogen and improve the mechanical condition of the soil is, therefore, absolutely necessary for the profitable and economical operation of an irrigated farm. Normally alfalfa is the best basis for crop rotation and soil improvement. Stock feeding is also very essential for the ultimate success of the irrigator on any normal project. The normal arid soil because of the deficiency of nitrogen will not produce more than three successive profitable crops of grain or potatoes. The third or fourth season's grain yield where no alfalfa has been grown, or no fertilizer applied, frequently falls as low as 15 bushels per acre, while hundreds of instances may be cited of wheat having produced three successive crops averaging from 60 to 75 bushels per acre after alfalfa or clover has been turned under after it has been grown for three years.

#### WHEN TO IRRIGATE.

Grain requires its maximum irrigation from the flowering to the soft dough period. Potatoes seem to require a moderate but uniform moisture content in the soil from the time the young tubers begin to form until they have reached their maturity. Alfalfa on the other hand has a tendency to produce the most crop where the most water is applied, although the increase that is made in the yield of the alfalfa after a depth of from two to three feet per annum has been applied is rarely proportional to the increase that must be made in the amount of water that is applied. Water should never be allowed to stand on alfalfa and a uniform moisture content should be maintained in the soil from the time the alfalfa has attained a height of six inches in the spring until the last crop of the season has been cut.

#### AMOUNT OF WATER REQUIRED.

A comprehensive investigation of the water requirements of soils and crops has been carried on in Idaho under my direction during the past five years and indicates that grains and all cultivated crops in general, including potatoes and orchards, require 1.5 acre-feet per acre during the season if planted on medium clay loam of four or more feet in depth. Alfalfa, the

clovers, and pasture, planted on the same type of soil have been found to require almost twice as much as the grains, or 2.5 acre feet per acre. The latter class of crops, however, do not require any more during the same length of season than the grains. The extra amount is required because of their longer growing season. The average annual precipitation of the localities investigated was about 12 inches, of which one-third occurred during the six growing months.

#### FINANCIAL ASSISTANCE USUALLY NECESSARY.

The second problem outlined at the beginning, that of securing sufficient finances with which to tide the irrigator over the lean period that almost invariably exists between the time when the farm is first settled upon and the time it is producing profitable returns, is most certainly one of the most serious problems that confront the irrigators of the northwestern part of the United States. The majority of the settlers on the new projects have started out with little or no experience, and with too little money. The land was always raw, necessitating a considerable expenditure at the outset for the clearing and levelling. An initial payment of about \$3.00 per acre had to be met. A house of some kind also had to be built, and the interest and the deferred payments had to be met each year. Then, too, because of insufficient finances and need for immediate money, a great incentive almost invariably existed for hasty and careless preparation of the land. Alfalfa in many instances was not planted for the first year or two, as it seemed imperative that some grain crop be planted that would unquestionably find a ready market before the end of the first year. The yields, because of the hasty preparation of the land, have in a large number of cases been disappointing. The prices that have been received for the crops have also been low, due to the local oversupply that is usually caused when so much new products are thrown on a partially developed market. The facilities for handling the rapid increase of the products of a new locality are sometimes far from adequate.

Due to the large initial expense which must be borne by the irrigator, to the many payments that must be met and to the glutting of undeveloped markets, there has usually arisen

on most new projects a serious need for credit. This need usually exists for at least five years after a project is inaugurated. This problem has never yet been successfully solved in our northwestern states, for the banks have never been sufficiently strong in the new localities to take care of the legitimate needs of the irrigators. I am informed that this problem is being experienced and that it is being solved in parts of the Canadian Northwest as the irrigation company has in many cases been financially able to take care of the just needs of its settlers at a reasonable rate of interest. I do not mean that money should be loaned to all settlers indiscriminately, for every settler on every project is not financially responsible, but it seems highly desirable at this time that every settler that needs financial assistance, and that has the necessary security in the form of livestock, land or crops, should be able to secure a reasonable amount of funds at a reasonable rate of interest with which to help to tide him over the lean period that almost invariably exists for the first few years on every normal irrigation project.

#### PROFITABLE MARKETING.

The third problem that has been mentioned is that of finding a profitable market for the crops and products that are ultimately produced on the farms. This is the problem that is now confronting many of the older and better irrigation projects throughout the Northwest. The early settlers of these projects rarely realized that such a problem would ever confront them, but to many it now seems to be the only problem, for the crop production has increased so much more rapidly that either the markets, the transportation facilities, or livestock consumption, could possibly take care of them, that the consumers have been at a serious loss to know what to do with their excess crops. The solution of the problem seems to be:

(1) The careful and systematic diversification of the crops of the farms as well as of the projects, so as to furnish no more products at any one time than the railroads can haul, or than the markets can take care of.

(2) The raising of more and better livestock in sufficient numbers to consume the majority of the excess products of the farms, thus concentrating the more bulky products in order

that they may be able to stand the long and expensive freight hauls from the interior.

(3) The selling or the distribution of the products through co-operative organizations similar to the organization that is selling and distributing the products of the Southern California citrus orchards so successfully.

Many new projects during the first few years of their history have produced so much hay that they could not dispose of it at a profitable figure. Some of these growers have gradually plowed up their alfalfa and rotated their crops and have begun raising potatoes, clover seed, sugar beets, etc. Others have secured enough hogs, sheep, beef cattle, or dairy cows to consume all of their products. The fruit and potato growers are marketing their produce through co-operative organizations which aim to decrease the cost to the consumers, and increase the producers' profit. The factors just mentioned tend to diversify the interests and solve the last and apparently the most serious problem that has confronted the irrigators on our large projects.

In closing, I wish to emphasize the desirability of selecting a good farm with medium soil in the beginning; of the fact that careful levelling and preparation of the soil pays big returns on the investment; that diversification of crops and crop rotation are highly important; that some means should be taken by the irrigation company to finance the legitimate needs of the irrigators during the early stages of the project; and that the irrigators should early realize the necessity of providing for the disposal of their crops either through the feeding of livestock or the efficient distribution of their well diversified products to a market which is able to handle them at a price that is profitable to both the producer and the consumer. (Applause.)